Marine Life Protection Act Initiative

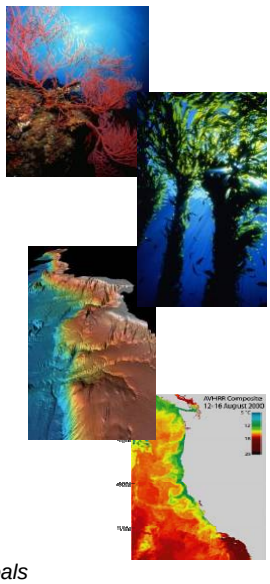
Draft Size and Spacing Evaluations of the Round 1 External Proposed MPA Arrays for the MLPA North Coast Study Region

Presentation to the MLPA Master Plan Science Advisory Team
March 16, 2010 • Eureka, CA

Dr. Mark Carr, Member • MLPA Master Plan Science Advisory Team

MLPA Goals*: Populations

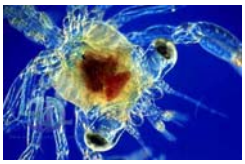
1. To protect the natural diversity and function of **marine ecosystems**.
2. To help sustain and restore **marine life populations**.
3. To improve **recreational, educational, and study opportunities** in areas with minimal human disturbance.
4. To protect representative and unique **marine life habitats**.
5. Clear objectives, effective management, adequate enforcement, sound science.
6. To ensure that MPAs are designed and managed as **a network**.



** Note that this language represents a summary of the MLPA goals*

Protecting Populations (Goals 2 & 6)

Size and Spacing



- MPAs should be large enough that adults do not move out of them too frequently and become vulnerable to fishing
- MPAs should be close enough together that sufficient larvae can move from one to the next

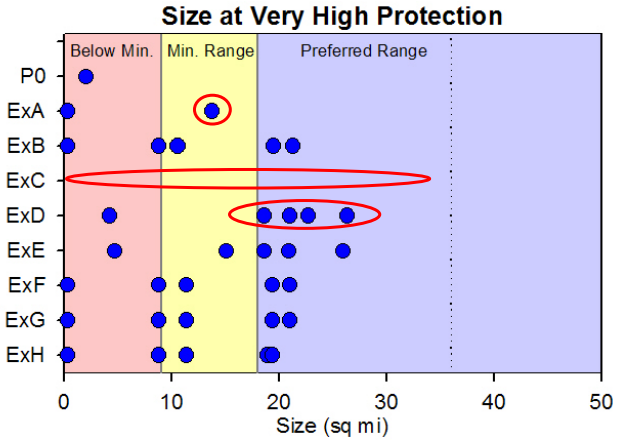
Size Guidelines

- **MPAs should have an alongshore span of 5-10 kilometers (3-6 miles) of coastline, and preferably 10-20 kilometers (6-12.5 miles)** to protect adult populations, based on adult neighborhood sizes and movement patterns. Larger MPAs should be required to fully protect marine birds, mammals, and migratory fish.
- **MPAs should extend from the intertidal zone to deep waters offshore** to protect the diversity of species that live at different depths and to accommodate the ontogenetic movement of individuals to and from nursery or spawning grounds to adult habitats.
- Combined and simplified, these two guidelines yield:
  - **Minimum range of 9-18 square miles**
  - **Preferred range of 18-36 square miles**

Size Analysis Methods

- Measure individual MPA areas
- Combine contiguous MPAs into MPA clusters
- Consider level of protection
- Tabulate MPA cluster areas relative to minimum and preferred guidelines
- Estuarine MPAs are not included in size evaluation.

Cluster Sizes: Very High Protection

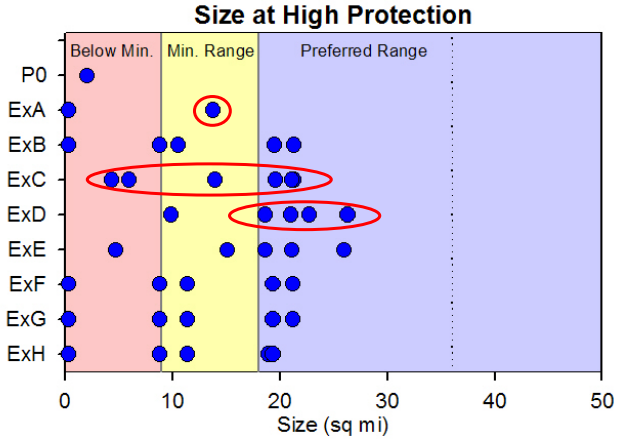


Number of MPA Clusters at Very High Protection

Proposal	Below Min. Size	Min. Size Range	Pref. Size Range	Total # Clusters
P0	1	0	0	1
ExA	1	1	0	2
ExB	2	1	2	5
ExC	0	0	0	0
ExD	1	0	4	5
ExE	1	1	3	5
ExF	2	1	2	5
ExG	2	1	2	5
ExH	2	1	2	5

- **ExC does not include any open coast MPAs at very high protection**
- **ExD includes the most preferred size clusters (4)**
- **ExA includes 1 minimum size cluster and no preferred size clusters**

Cluster Sizes: High Protection*

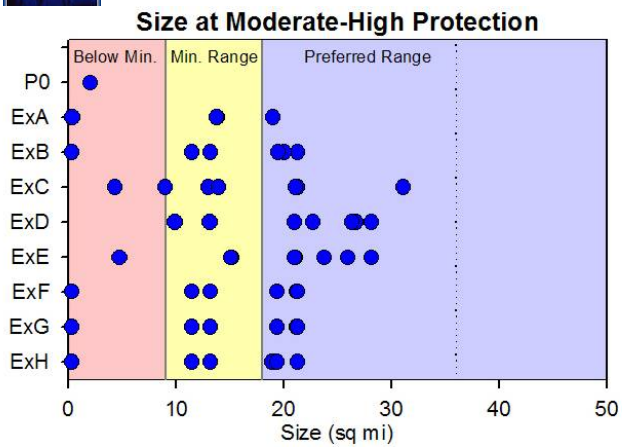


Number of MPA Clusters at High Protection				
Proposal	Below Min. Size	Min. Size Range	Pref. Size Range	Total # Clusters
P0	1	0	0	1
ExA	1	1	0	2
ExB	2	1	2	5
ExC	2	1	3	6
ExD	0	1	4	5
ExE	1	1	3	5
ExF	2	1	2	5
ExG	2	1	2	5
ExH	2	1	2	5

- **ExC includes 5 high protection clusters, 3 meet the size guidelines**
- **ExD includes the most preferred size clusters (4)**
- **ExA includes 1 minimum size cluster and no preferred size clusters**

** Evaluated for all open coast MPAs at or above high protection*

Cluster Sizes: Mod-high Protection*



Number of MPA Clusters at Moderate-High Protection				
Proposal	Below Min. Size	Min. Size Range	Pref. Size Range	Total # Clusters
P0	1	0	0	1
ExA	1	2	1	4
ExB	1	2	3	6
ExC	1	3	3	7
ExD	0	2	6	8
ExE	1	2	5	8
ExF	1	2	3	6
ExG	1	2	3	6
ExH	1	2	3	6

- **Across all proposals, most clusters meet size guidelines**
- **All proposals include at least 1 (ExA) and up to 6 (ExD) preferred size clusters**

** Evaluated for all open coast MPAs at or above mod-high protection*

Size: Conclusions

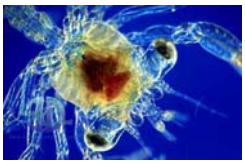
- ExD has the largest number of MPA clusters that meet preferred size guidelines
- ExA has the fewest MPA clusters that meet minimum or preferred size guidelines at high and mod-high protection
- Ranking of arrays for median cluster size at moderate-high protection:

  ExD > ExE > ExB, ExF, ExG & ExH > ExC > ExA
- All arrays have some MPAs that do not meet minimum size guidelines at very high protection

Protecting Populations

Size and Spacing

- MPAs should be large enough that adults do not move out of them too frequently and become vulnerable to fishing.
- MPAs should be close enough together that sufficient larvae can move from one to the next.



Design Guidelines: Goals 2 and 6

- **MPAs should be placed within 50-100 kilometers (31-62 miles) of each other** to facilitate dispersal and connectedness of important bottom-dwelling fish and invertebrate groups among MPAs.
- Because many populations are habitat-specific, spacing is evaluated for each habitat.

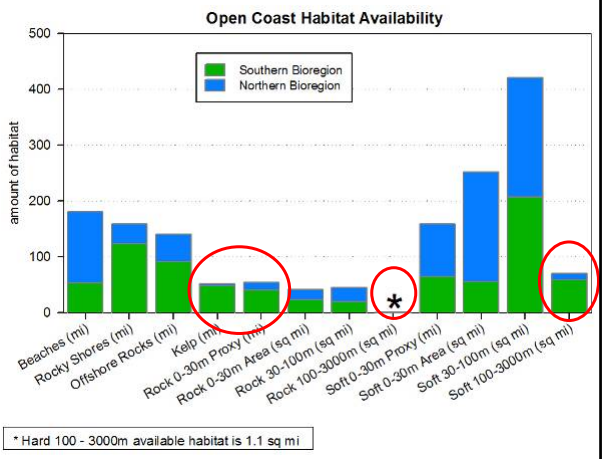
Spacing Analysis Methods

- MPAs or clusters must meet the minimum size guidelines (9 square miles) to be included in the spacing analysis.
- Identify the habitats included in sufficient amounts to count as a “replicate” within each MPA cluster.
- Measure gaps between adjacent MPA clusters that contain a given habitat (edge to edge).
- Spacing is calculated for mainland MPAs only.

Habitat Availability and Spacing

Habitat availability and distribution limits spacing:

- Kelp and 0-30 meter (m) rock rare in the northern bioregion
- >100m depth habitats are rare across the region, occurring mostly in canyons in southern bioregion



Note: some substrate mapping and 0-30m proxy line were not available when external MPA arrays were designed

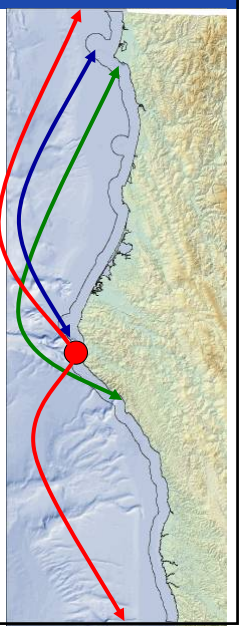
Spacing: Unevenly Distributed Habitats

- **For some unevenly distributed habitats, spacing guidelines impossible to meet**
- Minimum possible spacing for these habitats:

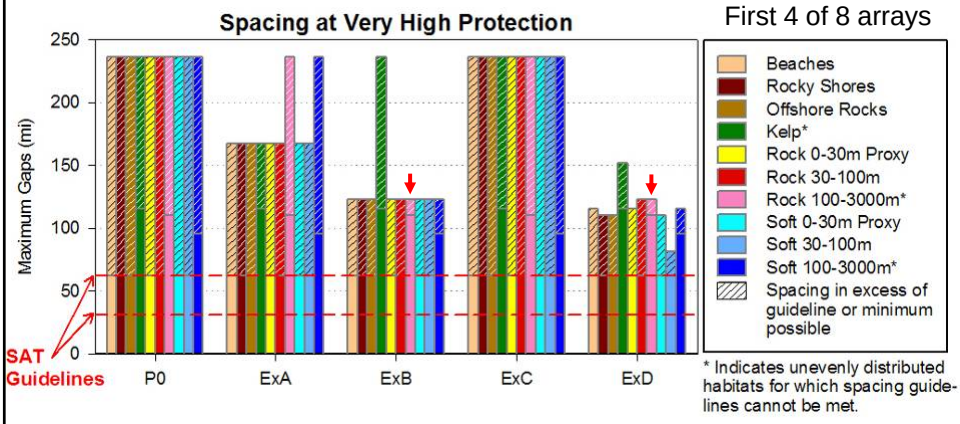
  Kelp: 115 miles (mi)

  Deep soft bottom (100-3000m): **95 mi**

  Deep rock (100-3000m)**: 110 mi** only available in one area in the NCSR

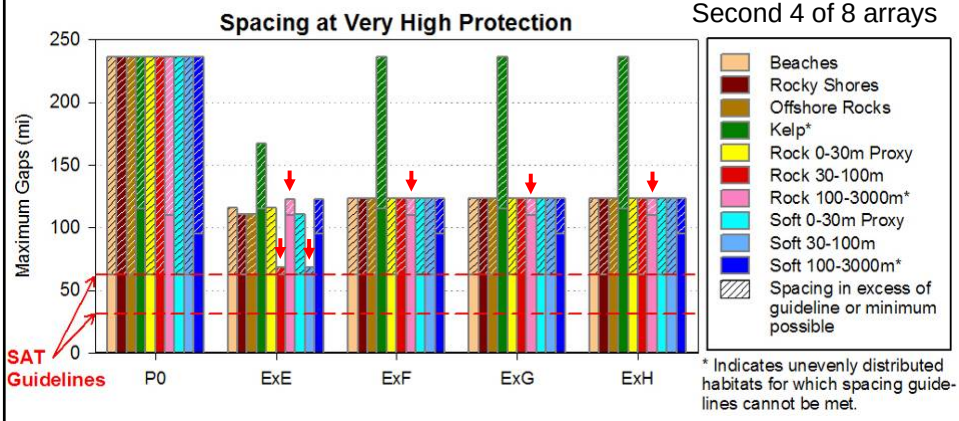


Max Gaps: Very High Protection



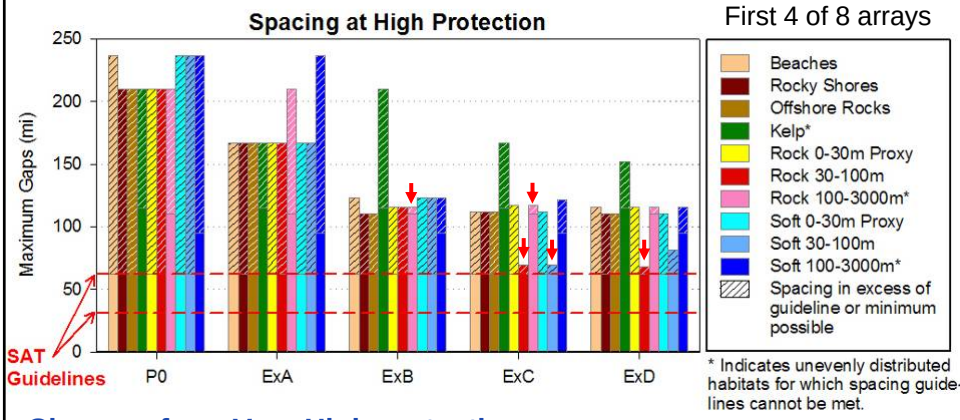
- **Not possible to meet spacing guidelines for kelp, rock 100-3000m, or soft bottom 100-3000m**
- **ExB and ExD approach minimum possible spacing for deep rock (100-3000m)**

Max Gaps: Very High Protection



- **Not possible to meet spacing guidelines for kelp, rock 100-3000m, or soft bottom 100-3000m**
- **ExE approaches spacing guideline for 30-100m rock and soft bottom**
- **ExE, ExF, ExG, and ExH approach minimum possible spacing for deep rock (100-3000m)**

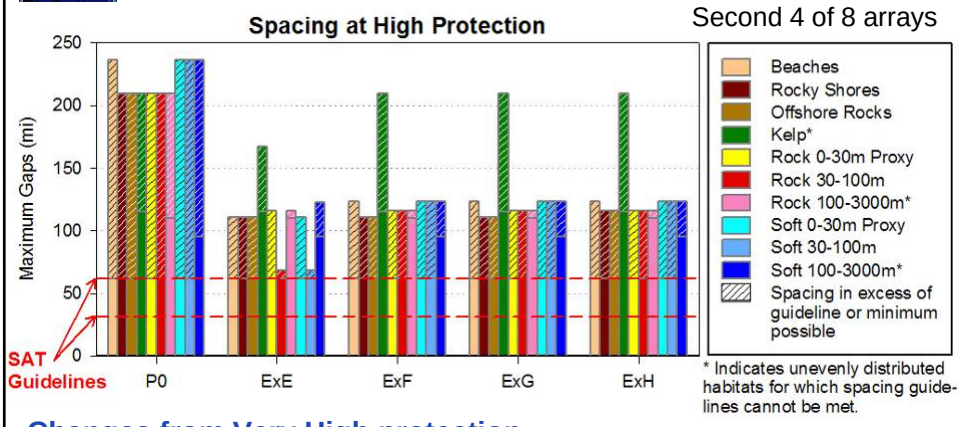
Max Gaps: High Protection



Changes from Very High protection:

- **ExB and ExC approach minimum possible spacing for deep rock**
- **ExC approaches spacing guideline for 30-100m rock and soft bottom**
- **ExD approaches spacing guideline for 30-100m rock**

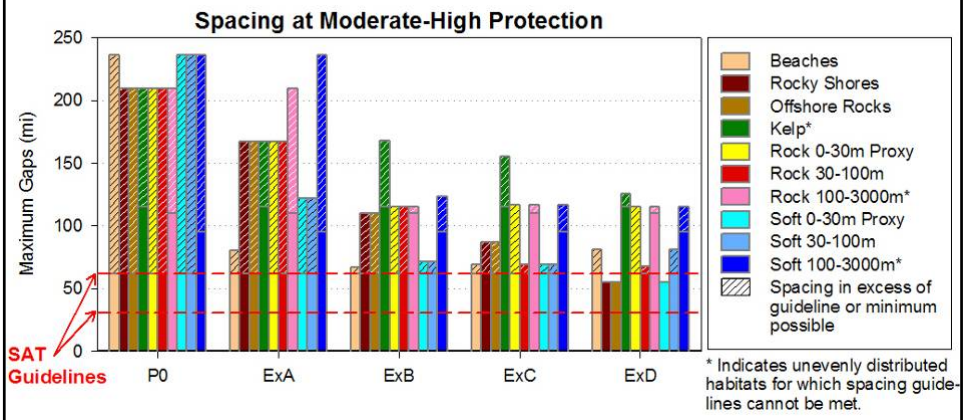
Max Gaps: High Protection



Changes from Very High protection:

- **Slight decrease in spacing for some habitats across all arrays**

Max Gaps: Mod-high Protection

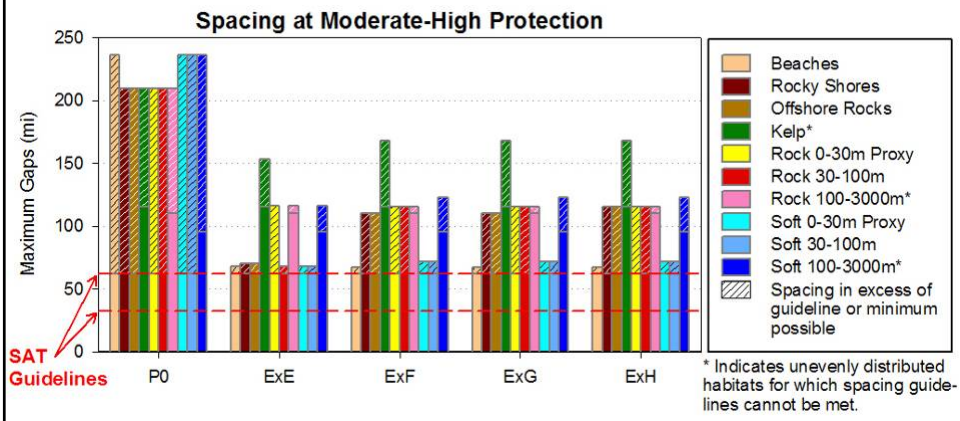


Number of habitats for which spacing is less than 10 miles over the maximum guideline (or minimum possible spacing):

ExA = 0 ExB = 4 ExC = 5 ExD = 5

ExD <u>falls within</u> spacing guidelines for 3 habitats

Max Gaps: Mod-high Protection



Number of habitats for which spacing is less than 10 miles over the maximum guideline (or minimum possible spacing):

ExE = 8 ExF = 4 ExG = 4 ExH = 4

Spacing: Conclusions

- ExD achieves spacing guidelines for 3 habitats and, on average, exceed the guidelines or minimum possible spacing by the lowest margin, followed closely by ExE.
- ExE has the fewest “large” gaps (>10 miles over the guideline or minimum possible).
- All arrays have substantial gaps in 0-30m rock as measured by the proxy line, possibly because this information was not available when arrays were designed.
- Ranking of arrays based on average gap in excess of the guideline or minimum possible spacing:

  ExD < ExE < ExC < [ExB, ExF, ExG & ExG] < ExA